INDOOR AIR QUALITY ASSESSMENT

Whitin Middle School
120 Granite Street
Uxbridge, Massachusetts

Prepared by:
Massachusetts Department of Public Health
Bureau of Environmental Health Assessment
Emergency Response/Indoor Air Quality Program
December 2003

Background/Introduction

At the request of a parent, the Massachusetts Department of Public Health (MDPH), Bureau of Environmental Health Assessment (BEHA) provided assistance and consultation regarding indoor air quality concerns at the Whitin Middle School (WMS) in Uxbridge, Massachusetts. The request was prompted by concerns about mold as a result of excessively humid weather experienced during the first three weeks of August 2003.

On September 11, 2003, a visit to conduct an assessment of the school was made by Cory Holmes and Sharon Lee, Environmental Analysts in BEHA's Emergency Response/Indoor Air Quality (ER/IAQ) Program. On September 18, 2003, Mr. Holmes conducted a follow up visit to examine remediation efforts relative to water damaged/mold colonized materials. These efforts are discussed further in the Microbial/Moisture Concerns section of this report.

The school is a two-story, red brick building on cement slab constructed in 1968. In 1998, renovations including an addition were made. Renovations included an upgrade to ventilation equipment. The second floor contains general classrooms, science labs, special education rooms, computer room and the library. The first floor consists of general classrooms, the school nurse's office, cafeteria, kitchen, teachers' room, art room, music room, gymnasium and office space. The former gymnasium from the 1968 building is currently used as a health education room. Windows throughout the building are openable.

Methods

BEHA staff performed a visual inspection of building materials for water damage and/or microbial growth. Air tests for carbon dioxide, temperature and relative humidity were taken with the TSI, Q-Trak, IAQ Monitor, Model 8551.

Results

This school houses 765 students in grades 5-8, with a staff of approximately 80. Tests were taken during normal operations at the school and results appear in Table 1.

Discussion

Ventilation

It can be seen from Table 1 that carbon dioxide levels were elevated above 800 parts per million of air (ppm) in twenty-four of forty-seven areas surveyed, indicating inadequate ventilation in many areas of the school. As indicated in Table 1, a large number of classrooms had open windows during the assessment. It is important to note that open windows can greatly reduce carbon dioxide levels. In contrast, some classrooms were equipped with air conditioning, which limits outside air intake on hot, humid days.

Fresh air in classrooms is supplied by a unit ventilator (univent) system (Picture 1). Univents draw air from outdoors through fresh air intakes located on the exterior walls of the building and return air through an air intakes located at the base of each unit (Figure 1). Fresh and return air are mixed, filtered, heated and/or cooled and provided to classrooms through a diffuser located on the top of the unit. Adjustable louvers control the ratio of fresh and recirculated air. As discussed, during the air conditioning season, outside air intake is limited in order to maximize cooling.

Univents were deactivated in a number of classrooms throughout the school. Obstructions to airflow, such as furniture located in front of and/or materials stored on univents, were observed (Picture 1). In order for univents to provide fresh air as designed, these units must remain activated and allowed to operate while rooms are occupied. In addition, air diffusers and return vents must remain free of obstructions.

The mechanical exhaust ventilation system consists of wall-mounted exhaust vents connected to exhaust fans on the roof. Exhaust ventilation is designed to operate continuously. In new wing of the school, however, several exhaust vents were not functioning during the assessment. According to school maintenance personnel, exhaust vents in this area were on work order for repair. Exhaust vents in the 1968 wing were drawing weakly in several classrooms. Two rooftop motors located at each end of the wing provide exhaust ventilation to the eleven classrooms in this section of the building. Exhaust ventilation was noticeably weaker in classrooms further away from exhaust motors.

In addition, the location of exhaust vents can limit exhaust efficiency. In the new wing, exhaust vents are located above hallway doors. When classroom doors are open, exhaust vents will tend to draw air from both the hallway and the classroom. The open hallway door reduces the effectiveness of the exhaust vent to remove common environmental pollutants from classrooms.

Lastly, wall vents were blocked by desks, cabinets, and other furniture (Picture 2). As with univents, in order for exhaust ventilation to function as designed, they must be activated and remain free of obstructions. Without supply and exhaust ventilation, indoor air pollutants can build up and lead to indoor air quality/comfort complaints.

To maximize air exchange, the BEHA recommends that both supply and exhaust ventilation operate continuously during periods of school occupancy. In order to have proper ventilation with a mechanical supply and exhaust system, the systems must be balanced to provide an adequate amount of fresh air to the interior of a room, while removing stale air from the room. School officials reported ventilation equipment is balanced annually. It is recommended that HVAC systems be re-balanced every five years to ensure adequate air systems function (SMACNA, 1994).

The Massachusetts Building Code requires that each room have a minimum ventilation rate of 15 cubic feet per minute (cfm) per occupant of fresh outside air or have openable windows (SBBRS, 1997; BOCA, 1993). The ventilation must be on at all times that the room is occupied. Providing adequate fresh air ventilation with open windows and maintaining the temperature in the comfort range during the cold weather season is impractical. Mechanical ventilation is usually required to provide adequate fresh air ventilation.

Carbon dioxide is not a problem in and of itself. It is used as an indicator of the adequacy of the fresh air ventilation. As carbon dioxide levels rise, it indicates that the ventilating system is malfunctioning or the design occupancy of the room is being exceeded. When this happens, a buildup of common indoor air pollutants can occur, leading to discomfort or health complaints. The Occupational Safety and Health Administration (OSHA) standard for carbon dioxide is 5,000 parts per million parts of air (ppm). Workers may be exposed to this level for 40 hours/week, based on a time-weighted average (OSHA, 1997).

The Department of Public Health uses a guideline of 800 ppm for publicly occupied buildings. A guideline of 600 ppm or less is preferred in schools due to the fact that the majority of occupants are young and considered to be a more sensitive population in the evaluation of environmental health status. Inadequate ventilation and/or elevated temperatures are major causes of complaints such as respiratory, eye, nose and throat irritation, lethargy and headaches. For more information concerning carbon dioxide, see Appendix I.

Temperature measurements ranged from 70° F to 79° F, which were within or very close to the BEHA recommended comfort range. The BEHA recommends that indoor air temperatures be maintained in a range of 70° F to 78° F in order to provide for the comfort of building occupants. In many cases concerning indoor air quality, fluctuations of temperature in occupied spaces are typically experienced, even in a building with an adequate fresh air supply.

The relative humidity measured in the building ranged from 42 to 62 percent, which was within the BEHA recommended comfort range, except in one area. The BEHA recommends a comfort range of 40 to 60 percent for indoor air relative humidity. Relative humidity in excess of 70 percent can provide an environment for mold and fungal growth (ASHRAE, 1989). Relative humidity levels in the building would be expected to drop during the winter months due to heating. The sensation of dryness and irritation is common in a low relative humidity environment. Low relative humidity is a very common problem during the heating season in the northeast part of the United States.

Microbial/Moisture Concerns

In the experience of BEHA staff, excessively humid weather can provide enough airborne water vapor to create adequate conditions for mold growth in buildings. In general, materials that are prone to mold growth can become colonized when moistened for more than 24 hours. Since hot, humid weather persisted in Massachusetts for more than 14 days during the month of August (The Weather Underground, 2003), materials in a large number of schools and buildings were moistened for an extended period of time. As a result, mold growth occurred in moistened materials. The mold growth was reported to be concentrated in 6th grade classrooms (103-107) on the first floor.

The materials listed in Table 1 were noted as either colonized with mold or in contact with mold spores. The majority of materials in the building that were colonized with mold were removable materials (e.g., books, desks, ceiling tiles and insulation) that can be cleaned or discarded/replaced (Pictures 3-6). Visible mold growth was noted primarily on non-porous surfaces (e.g., floors, desks, and chairs) constructed of materials that are not likely to be colonized by mold. Rather, these non-porous surfaces were coated with materials (e.g., dust) that can support microbial growth if exposed to moisture for extended periods of time. Therefore, cleaning of non-porous surfaces should remedy the mold contamination problem within the WMS. In contrast, porous materials (e.g., boxes, books, insulation and ceiling tiles) should be removed/replaced to prevent further mold contamination problems.

The US Environmental Protection Agency and the American Conference of Governmental Industrial Hygienists (ACGIH) recommends that porous materials be dried with fans and heating within 24-48 hours of becoming wet (US EPA, 2001; ACGIH, 1989). If porous materials are not dried within this time frame, mold growth may occur. Water-damaged porous materials cannot be adequately cleaned to remove mold growth. The application of a mildewcide to moldy porous materials is not recommended.

At the conclusion of the September 11, 2003 visit, BEHA staff recommended the following:

- Physical cleaning of all non-porous surfaces (e.g., chairs, tables, desks) colonized with mold using a bleach and water solution, followed by wet wiping with a soap and water solution.
- Replacement of mold-colonized pipe insulation.
- Inspection and/or removal of all non-porous materials (e.g. books, papers) for microbial growth.
- Replacement of water damaged/mold colonized ceiling tiles.

BEHA staff returned to the WMS on September 18, 2003 to examine remedial actions. During the follow-up assessment, BEHA staff observed that mold colonized books had been removed, non-porous surfaces were cleaned and disinfected and pipe insulation had been replaced.

As previously noted, some water damaged ceiling tiles in 6th grade classrooms, as well as ceiling tiles in the guidance/health suite had visible mold growth (Table 1/Picture 7). Hallways and classrooms in other portions of the building also had water damaged ceiling tiles. These ceiling tiles appear to have sustained damage from leaks in the air conditioning/drainage system rather than from excessive humidity.

A potential pathway for moisture into the building includes open utility holes in exterior walls (Picture 8). Several classrooms had open utility holes, which appeared to have been drilled for univent condensation drains. These holes are breaches to the building envelope that can allow water penetration into the building. Repeated water penetration can result in the chronic wetting of building materials and potentially lead to microbial growth. In addition, these large wall cracks/holes may provide a means of egress for pests/rodents into the building.

Water vapor was also observed collecting within a number of double-paned glass windows in several classrooms. This condition indicates that the window's water seal is no longer intact. Under certain conditions, water penetration through window frames can lead to mold growth.

Several classrooms contained a number of plants. In several classrooms, plants were found on top of univents. Plants, soil and drip pans can serve as sources of mold growth, and thus should be properly maintained. Plants should have drip pans to prevent wetting and subsequent mold colonization of window frames. Plants should also be located away from univents and ventilation sources to prevent aerosolization of dirt, pollen or mold.

Lastly, spaces between the sink countertop and backsplash were noted in a number of classrooms (Picture 9). Improper drainage or sink overflow can lead to water penetration. If the seam is not watertight, water can penetrate and collect behind the countertop or within cabinets. Like other porous materials, if these materials become wet repeatedly they can provide a medium for mold growth.

Other Concerns

Several other conditions that can affect indoor air quality were noted during the assessment. A number of univents had accumulated dirt, dust and debris within the air handling chambers and diffusers (Picture 10). Dust can be irritating to the eyes, nose and respiratory tract. In order to avoid this equipment serving as a source of aerosolized particulates, the air handling sections of the univents should be cleaned regularly (e.g., during regular filter changes).

In addition, two window-mounted air conditioners were located in the computer room. This equipment is normally fitted with filters. Filters for both air-conditioners were occluded with dust (Picture 11). To avoid the build up and re-aerosolization of dirt, dust and particulate matter, filters should be cleaned or changed as per manufacturer's instructions.

Furthermore, a number of exhaust vents in classrooms were noted with accumulated dust (Picture 12). If exhaust vents are not functioning, backdrafting can occur, which can re-aerosolize accumulated dust particles.

Items were observed hanging from ceiling tiles. Movement or damage to ceiling tiles can release dirt, dust and particulates accumulated in the ceiling plenum into occupied areas. As previously discussed, dust can be irritating to the eyes, nose and respiratory tract.

A chemical odor detected in classroom 106 was identified as a plug-in type air freshener. Air fresheners contain chemicals that can be irritating to the eyes, nose and throat of sensitive individuals. Furthermore, air fresheners do not remove materials causing odors, but rather mask odors, which may be present in the area.

Cleaning products and other chemicals were found in floor level cabinets and on counter tops in several classrooms. Cleaning products contain chemicals (such as bleach or ammonia-related compounds), which can be irritating to the eyes, nose and throat. These items should be stored properly and out of the reach of students.

Several classrooms contained dry erase boards and dry erase board markers. Materials such as dry erase markers and dry erase board cleaners may contain volatile organic compounds (VOCs), such as methyl isobutyl ketone, n-butyl acetate and butyl-cellusolve (Sanford, 1999), which can be irritating to the eyes, nose and throat.

In an effort to reduce noise from sliding chairs, tennis balls had been cut open and placed on chair legs (Picture 13). Tennis balls are made of a number of materials that are a source of respiratory irritants. Constant wearing of tennis balls can produce fibers and cause off-gassing of VOCs. Tennis balls are made with a natural rubber latex bladder, which becomes abraded when used as a chair leg pad. Use of tennis balls in this manner may introduce latex dust into the school environment. Some individuals are highly allergic to latex (e.g., spina bifida patients) (SBAA, 2001). It is recommended that the use of materials containing latex be limited in buildings to reduce the likelihood of symptoms in sensitive individuals (NIOSH, 1997). A question and answer sheet concerning latex allergy is attached as Appendix II (NIOSH, 1998).

Lastly, pencil shavings were observed to be accumulating at the base of pencil sharpeners, which in many classrooms are stationed on bookcases located in front of windows (Picture 14). When windows are opened, pencil shavings can become airborne, providing a source for eye and respiratory irritation.

Conclusions/Recommendations

The conditions noted at the WMS raise a number of indoor air quality issues. The general building conditions, excessive outdoor humidity over the summer and the operation (or lack of operation) of HVAC equipment, if considered individually, present conditions that could degrade indoor air quality. When combined, these conditions can serve to further negatively affect indoor air quality.

In view of the findings at the time of the visit, the following recommendations are made:

1. Continue to examine pipe insulation in the interior of univents for microbial growth, remove and replace as necessary.
2. Continue to work with concerned individuals to identify and address IAQ/mold concerns. Should mold issues recur, remove mold-contaminated materials in a manner consistent with recommendations found in "Mold Remediation in Schools and Commercial Buildings" published by the US Environmental Protection Agency (US EPA, 2001). Copies of this document can be downloaded from the US EPA website at: http://www.epa.gov/iaq/molds/mold_remediation.html.
3. Operate both supply and exhaust ventilation continuously during periods of school occupancy independent of classroom thermostat control.

4. Examine each univent for function. Survey classrooms for univent function to ascertain if an adequate air supply exists for each room. Operate univents while classrooms are occupied.
5. Continue with plans to repair rooftop exhaust motor. Consider contacting an HVAC engineering firm for advice to improve exhaust ventilation.
6. Remove all blockages from univents and exhaust vents.
7. For buildings in New England, periods of low relative humidity during the winter are often unavoidable. Therefore, scrupulous cleaning practices should be adopted to minimize common indoor air contaminants whose irritant effects can be enhanced when the relative humidity is low. Drinking water during the day can help ease some symptoms associated with a dry environment (throat and sinus irritations).
8. Replace/repair any remaining water-stained ceiling tiles and building materials. Examine the area above and around these areas for mold growth. Disinfect areas of water leaks with an appropriate antimicrobial.
9. Keep windows closed during hot, humid weather to maintain indoor temperatures and avoid condensation problems.
10. Repair/replace seals around window frames to prevent water penetration.
11. Move plants away from univents in classrooms. Ensure all plants are equipped with drip pans. Examine drip pans for mold growth and disinfect areas of water leaks with an appropriate antimicrobial where necessary. Consider reducing the number of plants.
12. Seal holes in exterior walls to prevent water intrusion.

13. Seal areas around sinks to prevent water-damage to the interior of cabinets and adjacent wallboard. Inspect wallboard for water-damage and mold/mildew growth, repair/ replace as necessary. Disinfect areas with an appropriate antimicrobial, as needed.
14. Clean and maintain dehumidifiers as per the manufactures instructions.
15. Store cleaning products properly and out of reach of students. Store flammables in a flameproof cabinet.
16. Clean univent air diffusers and exhaust vents periodically of accumulated dust.
17. Refrain from using strong scented materials (e.g., air fresheners) in classrooms.
18. Consider adopting the US EPA document, "Tools for Schools" to maintain a good indoor air quality environment on the building. This document can be downloaded from the Internet at http://www.epa.gov/iaq/schools/index.html.
19. For further building-wide evaluations and advice on maintaining public buildings, see the resource manual and other related indoor air quality documents located on the MDPH's website at http://www.state.ma.us/dph/beha/iaq/iaqhome.htm.

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Picture 1

Picture 2

Classroom Exhaust Vent Partially Obstructed by Boxes

Picture 3

Mold Colonization (Dark Stains) on Univent Pipe Insulation

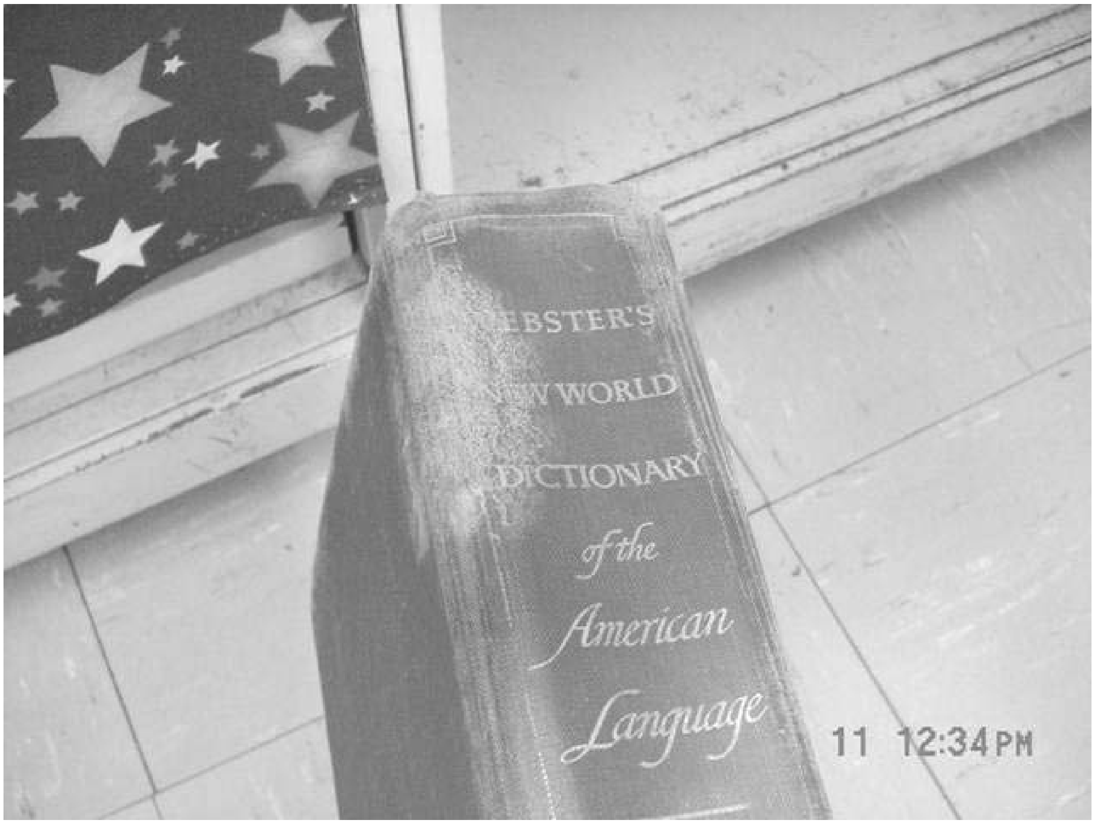
Picture 4

Mold Colonization (Dark Stains) on Underside of Desk

Picture 5

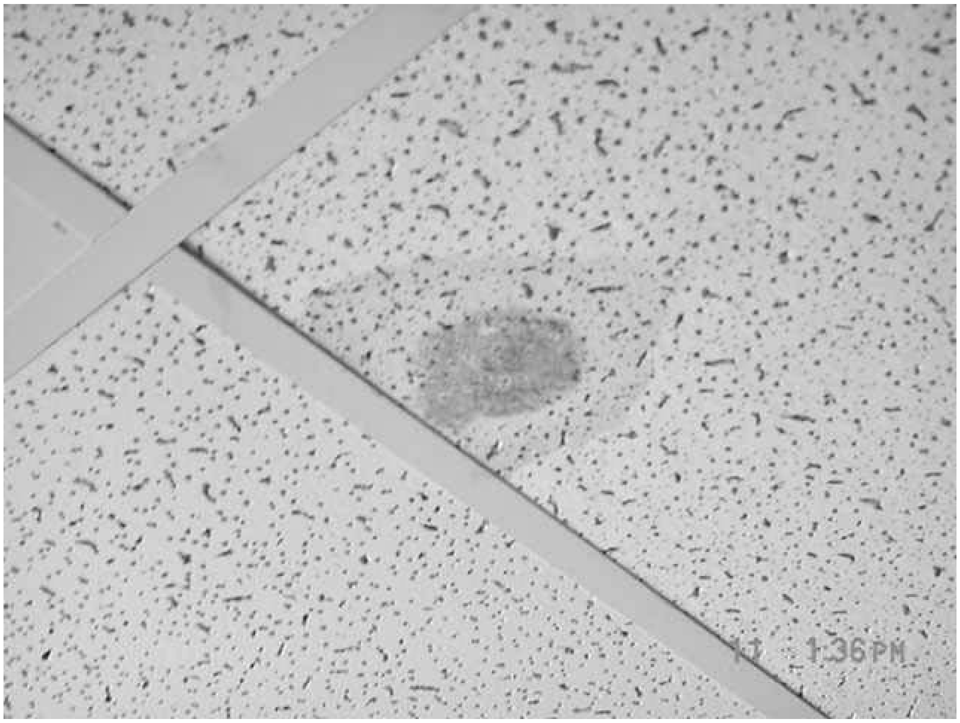
Mold Colonization (Dark Stains) on Underside of Chair

Picture 6



Mold Growth on Textile Book Surface

Picture 7

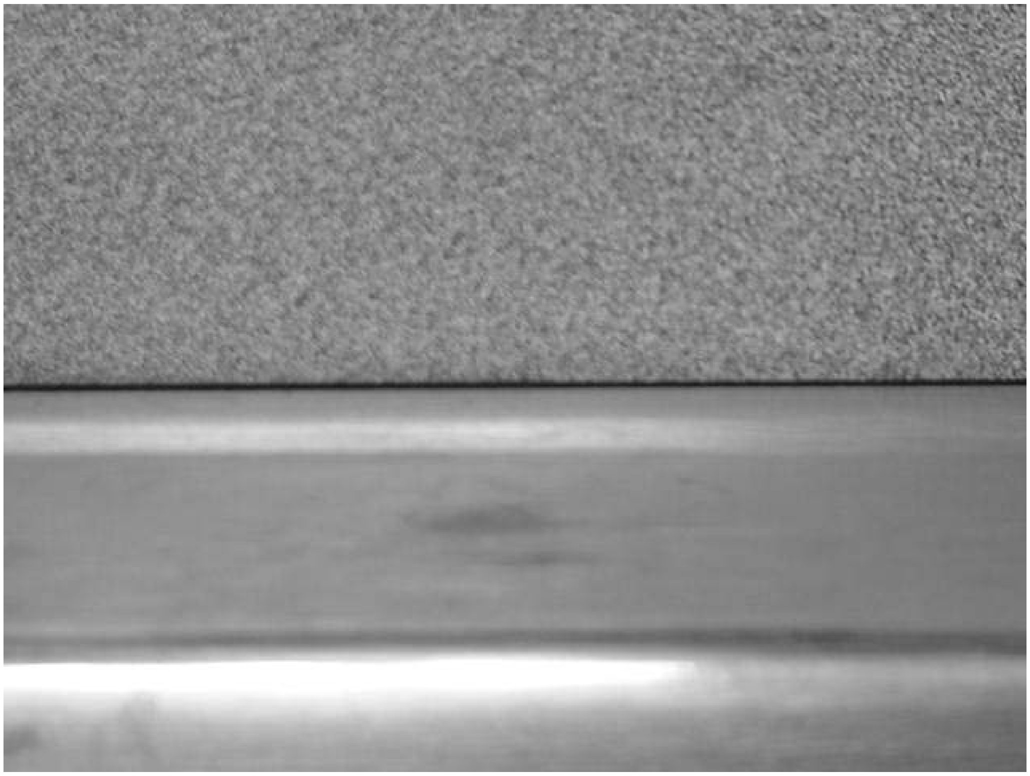


Water Damaged Ceiling Tile in Health/Guidance Suite

Picture 8

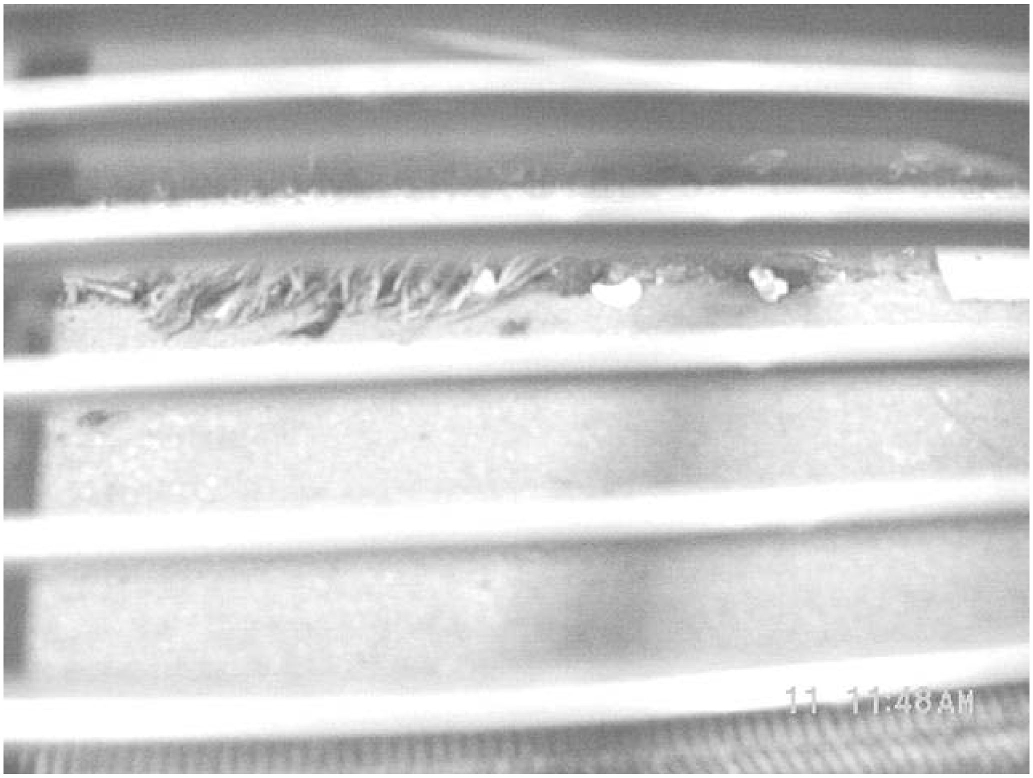
Open Utility Hole in Exterior Classroom Wall

Picture 9



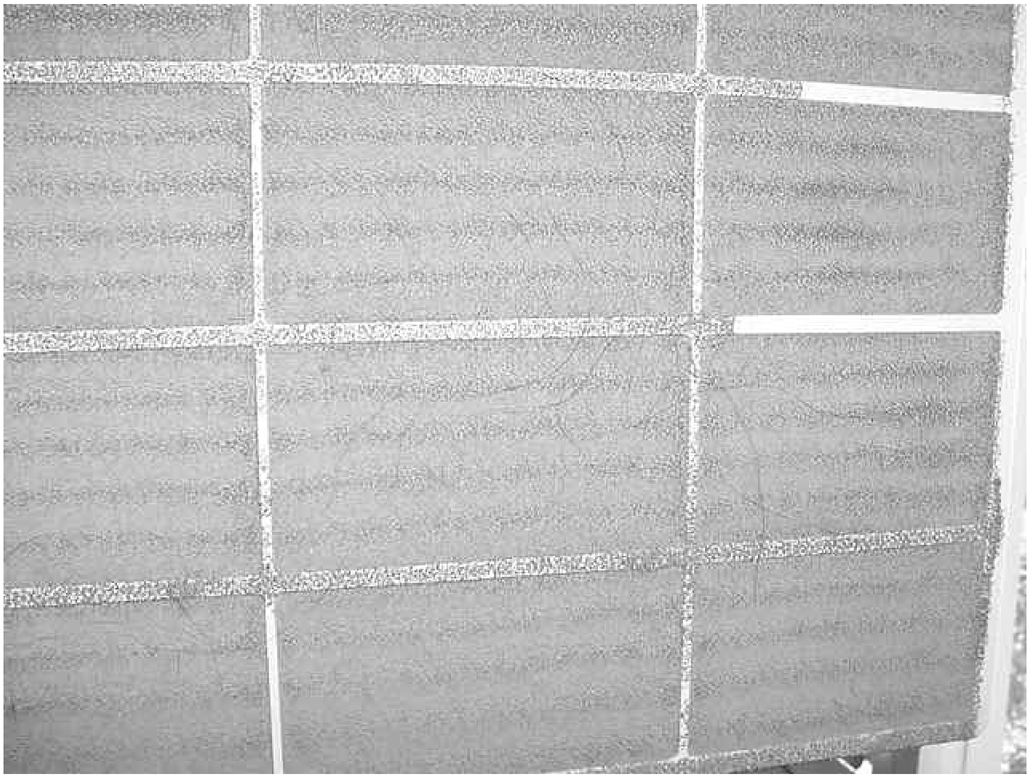
Space between Sink and Counter

Picture 10



Dirt, Dust and Debris in Univent Air Diffuser

Picture 11



Dust Accumulated on Air Conditioner Filter

Picture 12

Damaged Exhaust Vent With Accumulated Dust

Picture 13

Tennis Balls on Chair Legs

Picture 14

Pencil Shavings Accumulated at Base of Sharpener

TABLE 1

Indoor Air Test Results – Whitin Intermediate School, Uxbridge, MA Date: September 11, 2003

Location	Carbon Dioxide (*ppm)	Temp. (°F)	Relative Humidity (%)	Occupants in Room	Windows Openable	Ventilation Supply	Ventilation Exhaust	Remarks
Outside (Background)	387	74	60					Weather Conditions: clear skies, light breeze
Room 100	850	74	60	24	Y	Y	Y weak	Plants, door open
Room 101	850	74	56	26	Y open	Y off	Y weak	DO, condensation between window panes
Room 102	688	74	57	28	Y	Y	Y	Plug-in air freshener
Room 103	700	71	51	0	Y	Y	Y	29 occupants gone 5 min, window open-AC on, mold on books, under tables/chairs, cork board surface
Room 104	644	71	59	27	Y	Y	Y	Debris in UV air diffuser, window open, mold on books, under tables/chairs
Room 105	784	72	52	28	Y	Y	Y	Dehumidifier, 3 WD-CT over UV, mold growth on pipe insulation above UV, mold on books, under tables/chairs

ppm = parts per million parts of air

WD = water damage
CT = ceiling tile
UV = univent
MT = missing tile

DEM = dry erase materials
DO = door open
PF = personal fan
CD = chalk dust

Comfort Guidelines

Carbon Dioxide -	< 600 ppm = preferred 600 - 800 ppm = acceptable > 800 ppm = indicative of ventilation problems
Temperature -	70 - 78 °F
Relative Humidity -	40 - 60%

TABLE 1

Indoor Air Test Results – Whitin Intermediate School, Uxbridge, MA   Date: September 11, 2003

Location	Carbon Dioxide (*ppm)	Temp. (°F)	Relative Humidity (%)	Occupants in Room	Windows Openable	Ventilation Supply	Ventilation Exhaust	Remarks
Room 107	1720	75	62	26	Y	Y	Y	Mold on books, under tables/chairs
Room 106	1073	77	58	25	Y	Y off	Y	Plug-in air freshener, window open, flowering plants near UV, 1 WD-CT
Room 109	713	77	51	2	Y open	Y	Y	
Room 108	1453	79	55	20	Y	Y	Y	2 WD-CT near window
Room 110	588	76	53	2	Y Open	Y off	Y blocked	Exhaust blocked TV cart, spaces missing/damaged caulking around sink, 1 WD-CT
Health/Guidance	790	70	51	2	N	Y	Y	2 CT-dark stain (possible mold growth)
Main Office	720	71	52	2	Y	Y	Y	4 WD-CT
Room 111	920	75	57	27	Y	Y off	Y	
Faculty Room	654	75	54	3	N	Y	Y	2 photocopiers, 2 WD-CTs over photocopier

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						Supply	Exhaust	
Cafeteria	587	75	52	5	Y	Y	Y	Last lunch ended 1 hr previously, condensation on windows near UV
Music	658	77	51	20	N	Y	Y	2 WD-CT in room corner, 2 WD-CT in piano room, 1 WD-CT music practice room
Old gym/Health Room	564	75	48	24	N	Y	Y	
Pre-K	544	75	49	1	N	Y	Y	Exterior door open
Room 209	1248	74	47	22	Y open	Y	Y blocked	CD, plants on univent, items hanging from light, DO
Room 208	1306	76	53	23	Y open	Y	Y blocked	CD, fish tank, personal fan, DO, items on univent, 4 broken CT, Plants, items hanging from CT
Library/Computer Lab	495	74	42	1	Y	Y	Y	30 Computers, insect on univent, WD windowsill
Reading Room	637	74	45	1	Y	Y	Y	MT, DEM, 1 WD-CT, pencil sharpener by window, DO

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						Supply	Exhaust	
Specialized Office	511	74	44	0	N	Y	N	PF, 2 WD-CT, DO
Hallway To Library								2 WD-CT
Computer Classroom	495	75	44	0	Y	Y	Y blocked	34 Computers, 2 window mounted ACs, filters to AC dirty
Room 206	1707	77	50	25	Y open	Y	Y weak, damaged	CD, PF, materials on univent,
Room 207	1085	76	45	27	Y open		Y blocked, weak	Plants on univent, CD, fridge on carpet, disinfectant wipes
Room 205	1396	74	44	25	Y	Y	Y blocked, weak	WD, spray cleaners, items hanging on CT, PF, AC (on), Broken CT, CD
Room 204	1845	76	54	23	Y	Y open	Y blocked, weak	Plants near univent, CD, DO, PF, DEM, DO

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						Supply	Exhaust	
Room 203	712	74	44	27	Y	Y	Y blocked	CD, DO, sinks dry
Room 202	1110	76	54	21	Y	Y	Y blocked	CD, pencil sharpener near window, PF, DEM
Room 201	1830	76	46	24	Y	Y	Y	Plant on univent, tennis balls on chair leg, pencil sharpener near window
Room 200	944	76	55	22	Y	Y	Y blocked	CD, DEM, air deodorizer
7th Grade Hallway								8 WD-CT scattered through building, disabled water fountain unit
Boys locker room bathroom							Y	
Boys locker room						Y	Y weak	
Special Ed classroom	592	74	46	0	Y	Y ceiling	Y ceiling	DEM, room partitioned, 1 WD-CT
Girls locker room						Y	Y weak	Ceiling mounted univent on high

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						Supply	Exhaust	
Reading Room	561	74	43	2	Y open	Y	Y	3 WD-CT, DEM, DO
Teachers' lounge	812	74	42	4	Y open	Y off		DEM, spray cleaner, 1 WD-CT
Room 216	909	76	51	23	Y	Y	Y	1 WD-CT, DO, DEM
Room 218	1099	76	49	29	Y	Y	Y over door	DEM, DO
Room 219	750	75	47	24	Y open	Y	Y over door	DEM, trash odor, dry sink
Room 217	784	76	50	26	Y	Y (off)	Y over door	DEM, MT to duct
Room 113 (Art)	870	73	53	25	Y open	Y	Y over door	Paint/crayon odor, 5 WD-CT, DEM, seam between sink and counter, spray Cleaners
Room 115	1336	75	52	18	Y	Y	Y over door	Dust/debris on window sill, broken CT, foam cleaners, DO
Room 117	973	74	48	24	Y open	Y	Y over door	DO, DEM, items on vents

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TABLE 1

Indoor Air Test Results – Whitin Intermediate School, Uxbridge, MA **Date: September 11, 2003**

Location	Carbon Dioxide (*ppm)	Temp. (°F)	Relative Humidity (%)	Occupants in Room	Windows Openable	Ventilation		Remarks
						Supply	Exhaust	
Room 116	1811	73	45	27	Y	Y	Y over door	DEM
Room 118	1059	72	50	26	Y open	Y	Y over door	DEM, plant on window sill, DO
Room 119	1321	73	57	28	Y open	Y weak	Y over door	Fish odor, DEM, 2 WD CT
Gymnasium	631	77	50	0		Y	Y	
Rooftop								1 exhaust vent under repair, 2 exhaust motors for 1968 wing

ppm = parts per million parts of air
WD = water damage CT = ceiling tile UV = univent MT = missing tile
DEM = dry erase materials DO = door open PF = personal fan CD = chalk dust

Comfort Guidelines

Carbon Dioxide - < 600 ppm = preferred
600 - 800 ppm = acceptable
> 800 ppm = indicative of ventilation problems
Temperature - 70 - 78 °F
Relative Humidity - 40 - 60%